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IS 15217 (2002): Fuel Oil for Diesel Generating Sets [PCD 3: Petroleum, Lubricants and their Related Products]

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Indian Standard

FUEL OIL FOR DIESEL GENERATING SETS — SPECIFICATION

ICS 75.160.20

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 2002

Price Group 3

Petroleum Products Sectional Committee, PCD 3

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Petroleum Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Indian industries are increasingly using heavy fuels in their DG sets for captive power generation as per IS 1593 : 1982 and IS 11488 : 1985. Therefore, a need was felt to formulate a separate specification of fuel oil to take care of requirements of DG set users for captive power plants and to overcome the problems of users/producers. Due consideration has been given for cleanliness/compatibility of fuel oil as well as thermal stability for control of sedimentation/sledging of the fuel oil components during thermal stressing and/or centrifugation.

In addition to OEMs specification the assistance has been derived from the following specifications:

a) IS 11488 : 1985 Specification for fuel oil for marine diesel engines, and

b) ISO 8217 : 1996 Petroleum products—Fuels (Class F) Specification of marine fuels

The proposed specification has two new tests, namely, accelerated dry sludge content and spot test for stability and compatibility of fuel oils, which are likely to take care of most of the user problems.

The composition of the committee responsible for formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FUEL OIL FOR DIESEL GENERATING SETS — SPECIFICATION

1 SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for fuel oil for use in diesel generating set engines.

1.2 This specification provides guidance for interested parties, such as diesel generating set designers, suppliers and purchasers of DG set fuels.

2 REFERENCES

The Indian Standards given below contain provisions which through reference in this text constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
1447 (Part 1) : 2000	Petroleum and its products— Methods of sampling : Part 1 Manual sampling (*first revision*)
1448	Methods of test for petroleum and its products
[P 2] : 1967	Acidity (*first revision*)
[P 4] : 1984	Ash, sulphated ash and water soluble ash (*second revision*)
[P 6] : 1984	Calorific value by Bomb calorimeter method (*first revision*)
[P 7] : 1960	Calorific value by calculation
[P 8] : 1967	Carbon residue by Ramsbottom method (*first revision*)
[P 10] : 1970	Cloud point and pour point (*first revision*)
[P 21] : 1992	Flash point (closed) by Pensky Martens apparatus (*second revision*)
[P 25] : 1976	Determination of kinematic and dynamic viscosity (*first revision*)
[P 30] : 1970	Sediment in crude and fuel oils by extraction (*first revision*)
[P 32] : 1992	Density and relative density (*second revision*)
[P 33] : 1991	Sulphur by Bomb method (*second revision*)
[P 40] : 1987	Water by distillation (*third revision*)

3 GRADES

The material shall be of the following two grades depending on kinematic viscosity:

a) FO DG Grade 1, and

b) FO DG Grade 2.

4 REQUIREMENTS

4.1 General

The material shall be homogenous blend of hydrocarbons derived from petroleum refining. This, however, shall not preclude the incorporation of small amounts of additives intended to improve ignition, combustion or other characteristics. The fuels shall be free from inorganic acids, grits and other foreign impurities.

4.2 The material shall also comply with the requirements prescribed in Table 1, when tested according to appropriate methods given in col 5 of Table 1.

5 PACKING AND MARKING

5.1 Packing

The material shall be packed in suitable containers, as agreed between the purchaser and supplier, and subject to the provisions of Red Tariff No.18 rules and rates for the conveyance by rates of explosives and other dangerous goods, issued by the Indian Railways Conference Association, with any alterations made thereafter.

5.2 Marking

5.2.1 The material shall be supplied in accordance with the marking and delivery instructions given by the purchaser.

5.2.2 Each container shall be supplied with the following information:

a) Name and grade of material;
b) Manufacturer's name, initials or his recognized trade-mark, if any;
c) Volume of contents in litres; and
d) Year of manufacture.

5.2.3 *BIS Certification Marking*

5.2.3.1 Each container may also be marked with the Standard Mark.

5.2.3.1.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in IS 1447 (Part 1).

6.2 All the characteristics given in this specification shall be tested on the composite sample.

6.3 The lot shall be declared as conforming to the requirements of this specification, if all the test results on the composite sample meet the corresponding specification requirements.

Table 1 Requirements for Fuel Oil for Use in Diesel Generating Sets

(*Clause* 4.2)

Sl No. (1)	Characteristic (2)	Requirement FO DG Grade 1 (3)	Requirement FO DG Grade 2 (4)	Method of Test, Ref to [P] of IS 1448 (5)
i)	Density at 15°C, g/ml, *Max*	0.991	0.991	P : 32
ii)	Kinematic viscosity, mm²/s, *Max* :			P : 25
	a) at 100°C	25	35	
	b) at 50°C	To be reported		
iii)	Flash point, PMCC, °C, *Min*	66	66	P : 21
iv)	Pour point, °C, *Max*	30	30	P : 10
v)	Conradson carbon residue/micro carbon residue, percent by mass, *Max*	15	20	P : 8[3]
vi)	Ash, percent by mass, *Max*	0.10	0.10	P : 4
vii)	Water content, percent by volume, *Max*	1.0	1.0	P : 40
viii)	Sediment, percent by mass, *Max*	0.25	0.25	P : 30
ix)	Sulphur, total percent by mass, *Max*	4.0	4.0	P : 33 & P : 35[4]
x)	Sodium, ppm , *Max*	50	50	[5]
xi)	Vanadium, ppm, *Max*	300	300	[5]
xii)	Aluminium + Silicon, ppm, *Max*	80	80	[6]
xiii)	Asphaltene, percent by mass, *Max*	10	14	[7]
xiv)	Accelerated dry sludge content[1] percent by mass, *Max*	0.1	0.1	[8]
xv)	Spot test for cleanliness[2] and compatibility rating	No. 2 (Faint or poorly defined inner ring)		[9]
xvi)	Acidity, inorganic	Nil	Nil	P : 2
xvii)	Gross calorific value, kcal/kg	To be reported		P : 6 (for reference) P : 7 (for routine)

NOTE— Characteristics mentioned at Sl No. (x) and (xi) are type tests.

[1] To be carried out at refinery at the time of production.

[2] To be carried out at the time of receipt of fuel oil to the storage tanks, with already present stock, at Marking Terminals and Customer Storage Tanks.

[3] ASTM D-4530 may also be followed.

[4] ASTM D-4294 may also be followed.

[5] Under preparation. Till such time ICP-AES/D-3605:1991 shall be followed.

[6] Under preparation. Till such time ICP-AES/IP 377:1995 shall be followed.

[7] Under preparation. Till such time IP 143 shall be followed.

[8] Under preparation. Till such time ISO 10307 and ASTM D-4870 / IP 390 shall be followed.

[9] Under preparation. Till such time ASTM D-4740 shall be followed.

Additional Requirement

Calculated Carbon Aromaticity Index (CCAI)—To be reported.

(Indication of ignition quality)

CCAI = $D - 81 - 141 \text{ Log Log } (V + 0.85) - 483 \text{ Log } [\, T{+}273)/323 \,]$;

D = density in kg/m^3, at 15°C; and

V = kinematic viscosity in cSt at temperature, T°C.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Petroleum Products Sectional Committee, PCD 3

Organization	*Representative(s)*
Indian Additives Ltd, Chennai	Shri R. A. Rao (***Chairman***) Shri G. S. Ramachandran (*Alternate*)
Ashok Leyland Ltd, Chennai	Shri M. Nirmal Kumar Shri S. K. Raju (*Alternate*)
Association of State Road Transport Undertaking (ASRTU), Pune	Shri A. S. Lakra
Automotive Research Association of India, Pune	Shri M. K. Chaudhari Shri A. R. Arankalle (*Alternate*)
Bharat Petroleum Corporation Ltd, Mumbai	Dr Y. P. Rao Shri R. Ramachandran (*Alternate*)
Bongaigaon Refinery & Petrochemicals Ltd, Dhaligaon (Assam)	Shri D. K. Phuran Shri Sagar Mathews (*Alternate*)
Centre for High Technology, New Delhi	Shri S. K. Singh Shri B. D. Ghosh (*Alternate*)
Central Institute of Road Transport (Training & Research), Pune	Shri B. K. Chapra Shri N. R. Kachare (*Alternate*)
Central Revenue Control Laboratory, New Delhi	Chief Chemist Deputy Chief Chemist (*Alternate*)
Chennai Petroleum Corporation Ltd, Chennai	Shri K. Raman Shri N. G. Subramanian (*Alternate*)
Chief Controller of Explosives, Nagpur	Dr A. S. Ghosal Shri R. S. Bhalekar (*Alternate*)
Cochin Refineries Ltd, Ambalamugal, Ernakulam	Shri C. I. Roy Shri K. P. Subramanian (*Alternate*)
Controllerate of Quality Assurance Petroleum Products, Ministry of Defence, DGQA	Shri S. K. Srivastava Shri Vijaya Kumar (*Alternate*)
Defence Materials and Stores Research & Development Establishment, Kanpur	Dr P. S. Venkataramani Dr A. K. Mehrotra (*Alternate*)
Directorate General Aeronautical Quality Assurance, Ministry of Defence, New Delhi	Director Shri G. S. Bhatnagar (*Alternate*)
Directorate General of Civil Aviation, New Delhi	Shri B. K. Joshi Shri S. S. Muzumdar (*Alternate*)
Directorate of Maintenance Plans & Inspection (Air Headquarter), Ministry of Defence, New Delhi	J D (QAS) [DD (QAS)] (*Alternate*)
Escorts Ltd, Faridabad	Shri Shive D. Khanna Shri H. C. Bahuguna (*Alternate*)
Exxon Chemical, Mumbai	Shri S. N. Sinha Shri M. S. Sheshya Sayee (*Alternate*)
Hero Honda Motors Ltd, Dist Mohinder Garh (Haryana)	Shri S. B. Gupta Shri P. K. Salhotra (*Alternate*)
Hindustan Petroleum Corporation Ltd, Visakhapatnam	Shri B. Saranathan Shri P. Seeta Rama Rao (*Alternate*)
Hindustan Petroleum Corporation Ltd, Mumbai	Shri M. K. Daxini
Ind-Auto Limited, Mumbai	Shri P. N. Burgulas Shri Y. J. Khanvekar (*Alternate*)
IBP Company Ltd, Kolkata	Shri A. G. Biswas Shri Vinod Moudgil (*Alternate*)
Indian Institute of Petroleum, Dehra Dun	Shri Sudhir Singhal Dr M. O. Garg (*Alternate*)
Indian Institute of Technology, Kanpur	Dr B. P. Pundir
Indian Oil Corporation Ltd (Marketing Division), Mumbai	Shri P. D. Bahukhandi Shri H. K. Sayal (*Alternate*)
Indian Oil Corporation Ltd (R & P Division), New Delhi	Shri K. K. Acharya Shri K. Balachandran (*Alternate*)

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Organization	*Representative(s)*
Indian Oil Corporation Ltd (Research & Development Centre), Faridabad	Shri N. R. Raje Shri B. S. Rawat (*Alternate*)
LML Ltd, Kanpur	Shri Dinesh Kumar
Lubrizol India Ltd, Mumbai	Shri M. R. Khumbhani Shri V. P. Wagh (*Alternate*)
Mangalore Refinery & Petro-Chemical Ltd, Mangalore	Shri R. Rajamani Shri S. Ramesh (*Alternate*)
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Reliance Petroleum Limited, Mumbai	Shri N. S. Murthy Shri R. V. Desai (*Alternate*)
Research, Designs and Standards Organization (RDSO), Lucknow	Deputy Director (AROCM III) [Asstt Research Officer (CM-3)] (*Alternate*)
Society of Indian Automobile Manufacturers, New Delhi	Kumari Pamella Tikku Shri K. K. Gandhi (*Alternate*)
Tata Engineering & Locomotive Co Ltd, Jamashedpur	Shri V. Laxminarayan Shri T. Seturamalingam (*Alternate*)
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Joint Director (PCD), BIS

Furnace Oils (Including Bunker Oil) Subcommittee, PCD 3:5

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Hindustan Petroleum Corporation Ltd, Mumbai	Shri M. K. Daxini
Hindustan Petroleum Corporation Ltd, Visakh Refinery, Visakhapatnam	Shri P. S. Rama Rao Shri B. Saranathan (*Alternate*)

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Organization	*Representative(s)*
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